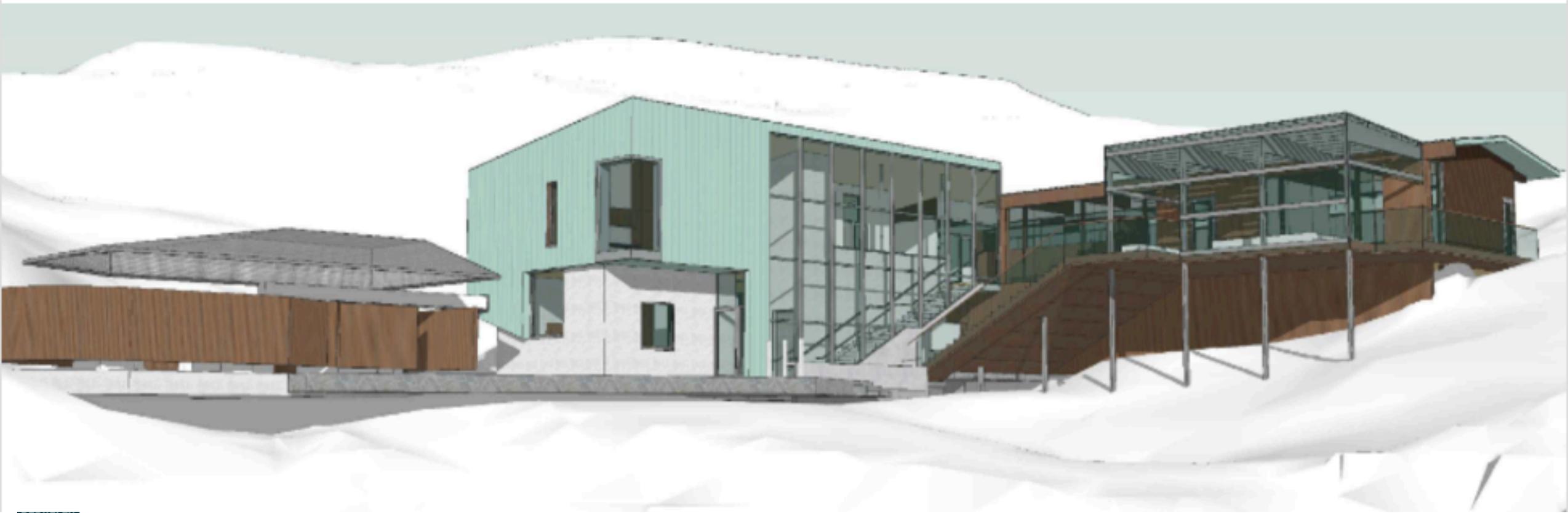


B73 SEISMIC UPGRADE AND SPACE RENOVATION PROJECT

Richard Stanton, Project Director
Adan Perez, Project Manager
Kasra Nowrouzi, Postdoctoral Scholar
John Mark Kreikebaum, Postdoctoral Scholar

Community Advisory Group Meeting
September 14, 2020



THE ADVANCED QUANTUM TESTBED

John Mark Kreikebaum & Kasra Nowrouzi

*Lawrence Berkeley National Laboratory & Physics Department
University of California, Berkeley*



Niels Bohr
(1885-1962)

THE
LONDON, EDINBURGH, AND DUBLIN
PHILOSOPHICAL MAGAZINE
AND
JOURNAL OF SCIENCE.

[SIXTH SERIES.]

JULY 1913.

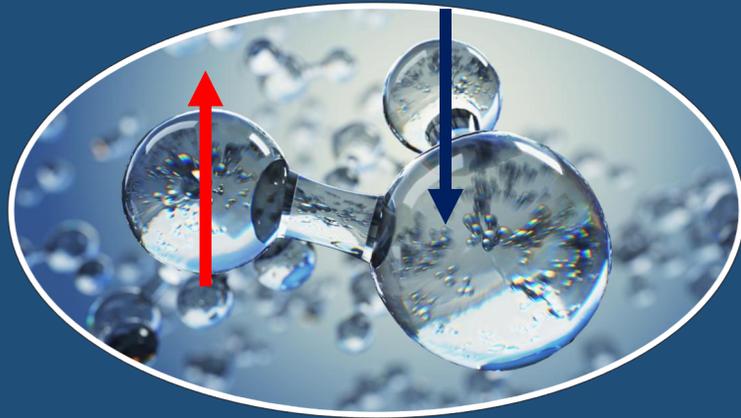
I. *On the Constitution of Atoms and Molecules.*
By N. BOHR, *Dr. phil. Copenhagen**.

- 19th century physics fails to describe the atom & light
- Planck & Bohr propose that the world is “grainy” (quantized)

rays, &c. The result of the discussion of these questions seems to be a general acknowledgment of the inadequacy of the classical electrodynamics in describing the behaviour of systems of atomic size †. Whatever the alteration in the

THE QUANTUM WORLD AROUND US

Water molecules have two hydrogens which have nuclear spin (up or down)



www.medicalnewstoday.com

**QUANTUM SYSTEMS CAN EXIST
IN MANY DIFFERENT
CONFIGURATIONS, EVEN IF WE
CAN'T OBSERVE ALL OF THEM!**

- Always observe  or 
- Prepare *superposition*:  =  + 
- Would measure: 50% , 50% 

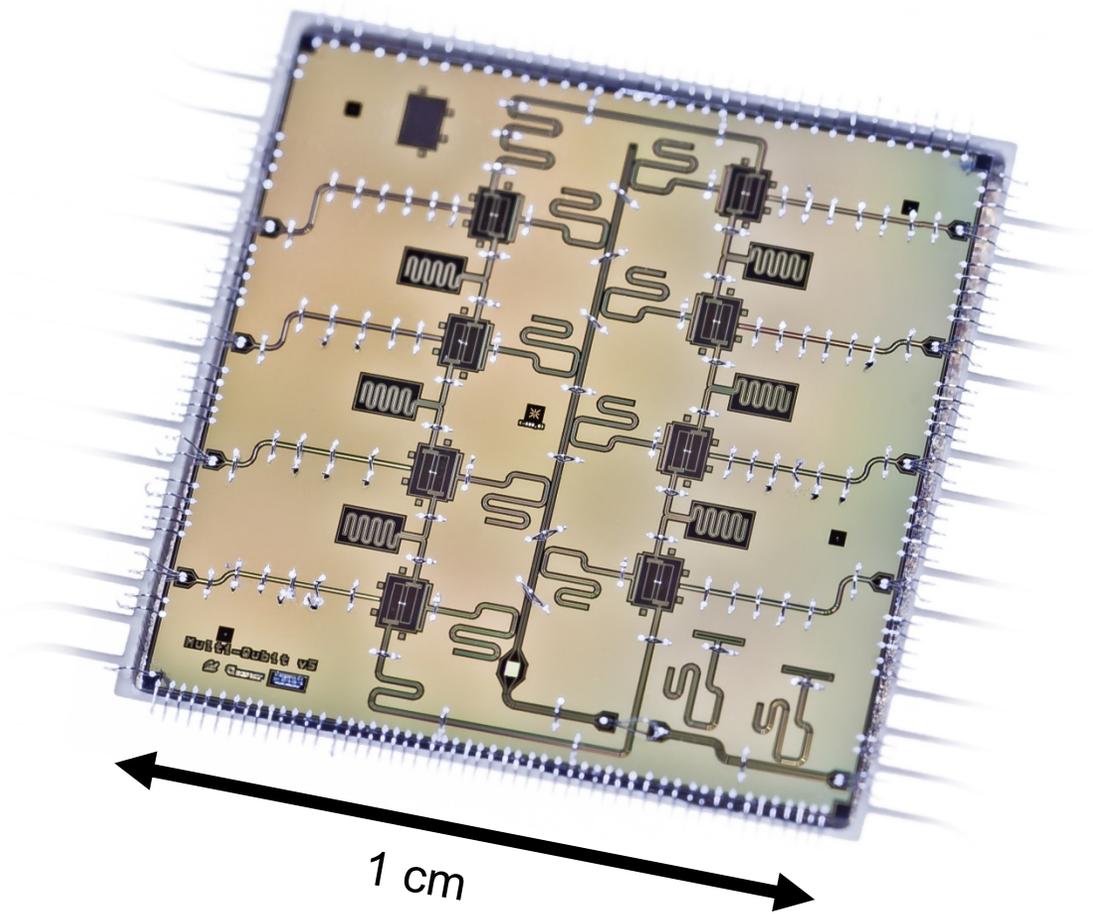
THE POWER OF QUANTUM ENTANGLEMENT

The units cannot be described
as a “product” of the individual
parts

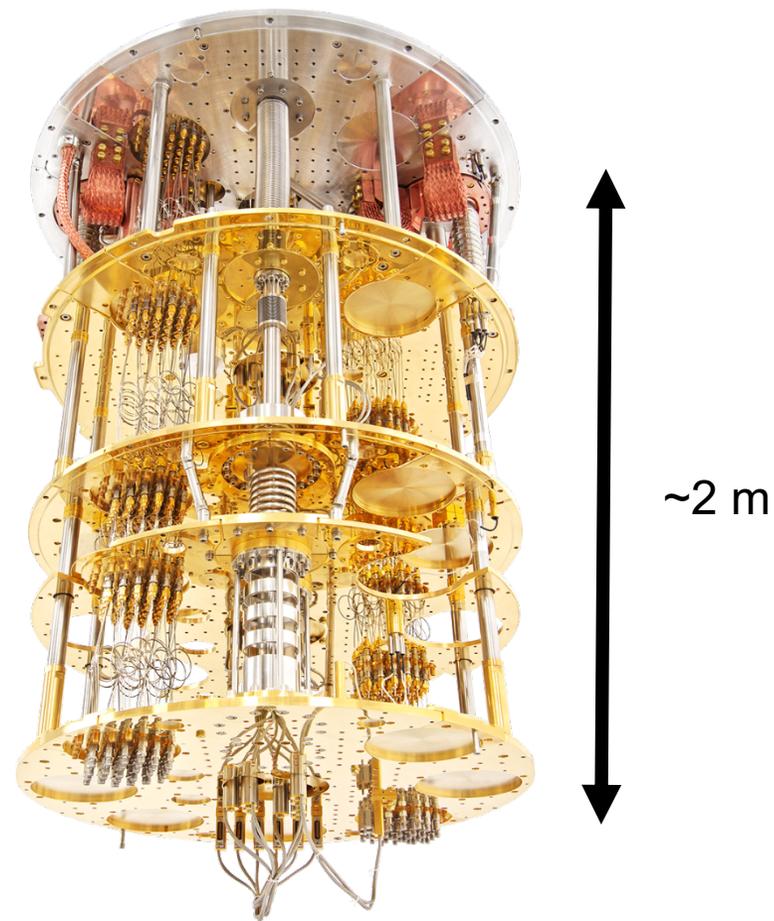
***CHALLENGE: CREATE & WIRE
UP ENTANGLEMENT !!***



Superconducting quantum processor



Dilution refrigerator



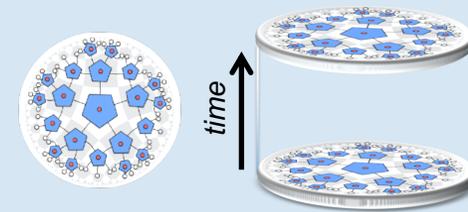
Temperature = 10 mK or -459.65 °F



SCIENCE APPLICATIONS OVERVIEW

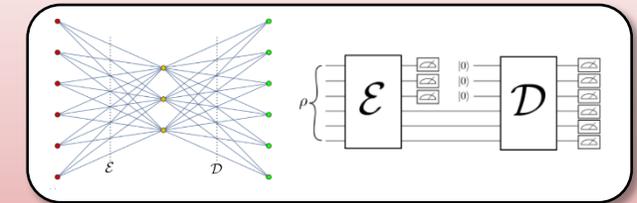
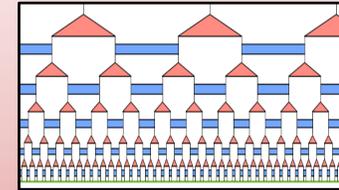
QUANTUM FIELD THEORY

- BLACK HOLES AND SCRAMBLING DYNAMICS



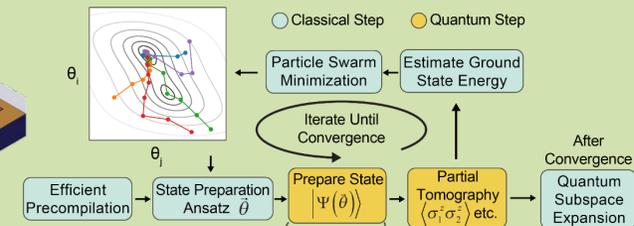
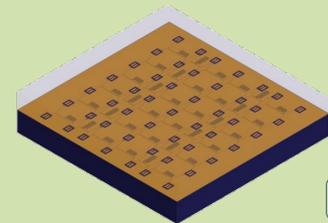
NEW QUANTUM ALGORITHMS

- HHL ALGORITHM TO SOLVE LINEAR SYSTEMS OF EQUATIONS
- SHOR'S ALGORITHM



QUANTUM CHEMISTRY

- LARGE-SCALE CHEMICAL SIMULATIONS



- Perfect select technology pathways

Industry

AQT

- Drive new fundamental notions in algorithms and quantum hardware

Academia

\$ 30 M over 5 years

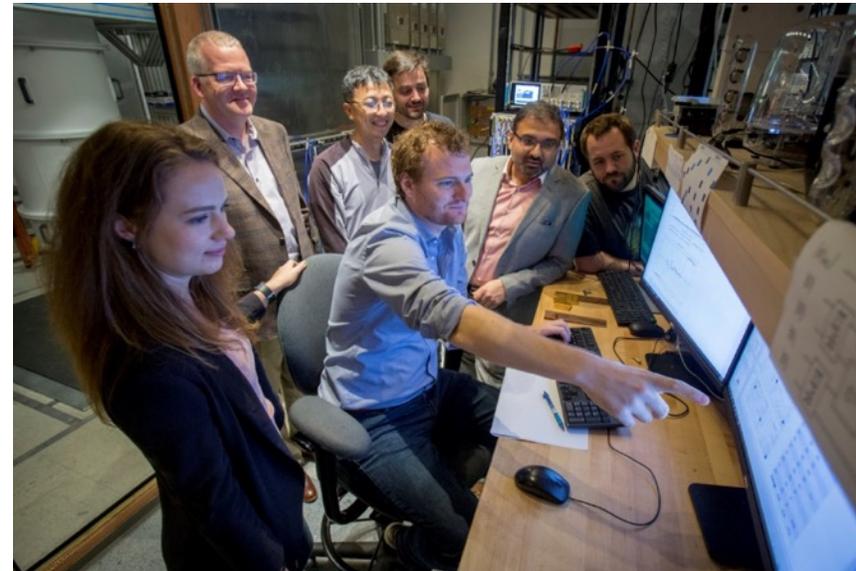
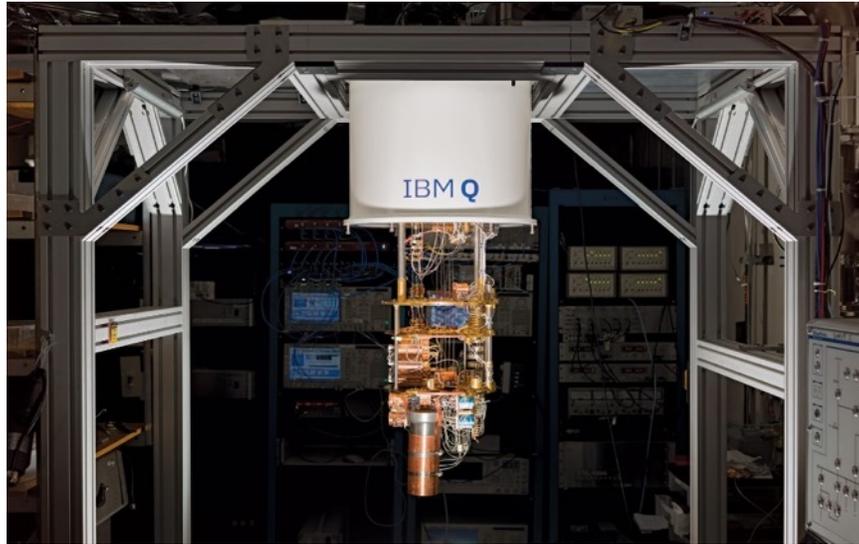


QUANTUM SYSTEMS ACCELERATOR

Catalyzing the Quantum Ecosystem

\$ 115 M over 5 years

REASON FOR PROJECT



- Berkeley Lab space is needed for Quantum Information Science.
- One of these science programs is the cryogenic superconducting quantum computer, the Advanced Quantum Testbed (AQT).

B73 LOCATION – BERKELEY LAB MAP



CSO26182 July, 2013

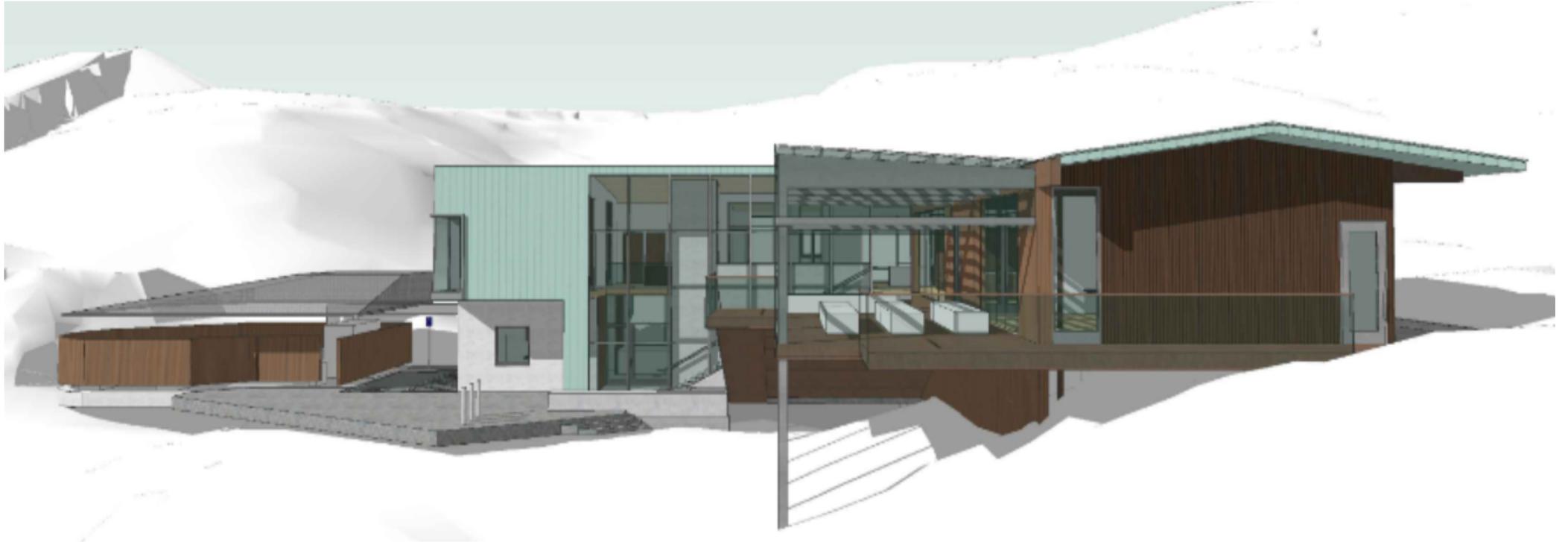
- Space is available in Building 73 (B73).
- B73 is located on the South-East portion of the Lab and is accessible via Centennial Drive, adjacent to UC Botanical Garden.

B73 BACKGROUND



- B73 is a small, two-story, wood-framed, lab and office facility.
- Constructed in phases beginning in 1960 with non-ferrous materials.
- Wood, non-ferrous construction and remote location minimize magnetic “noise”.
- Unoccupied: Suffers from mold, moisture, pest, and seismic issues.

B73 SCOPE



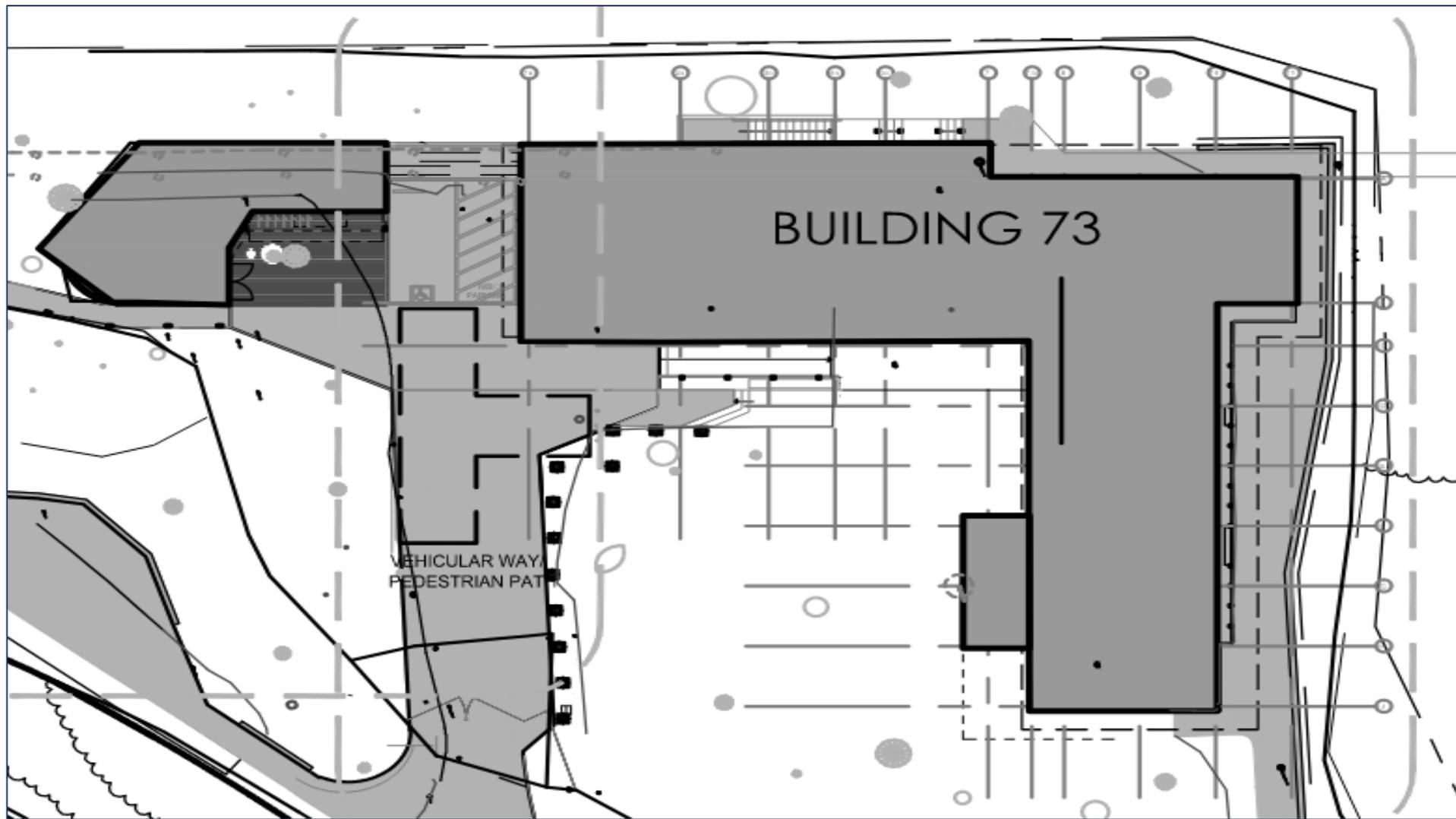
Project Objectives:

- Seismically upgrade the entire building.
- Renovate for lab and office use.

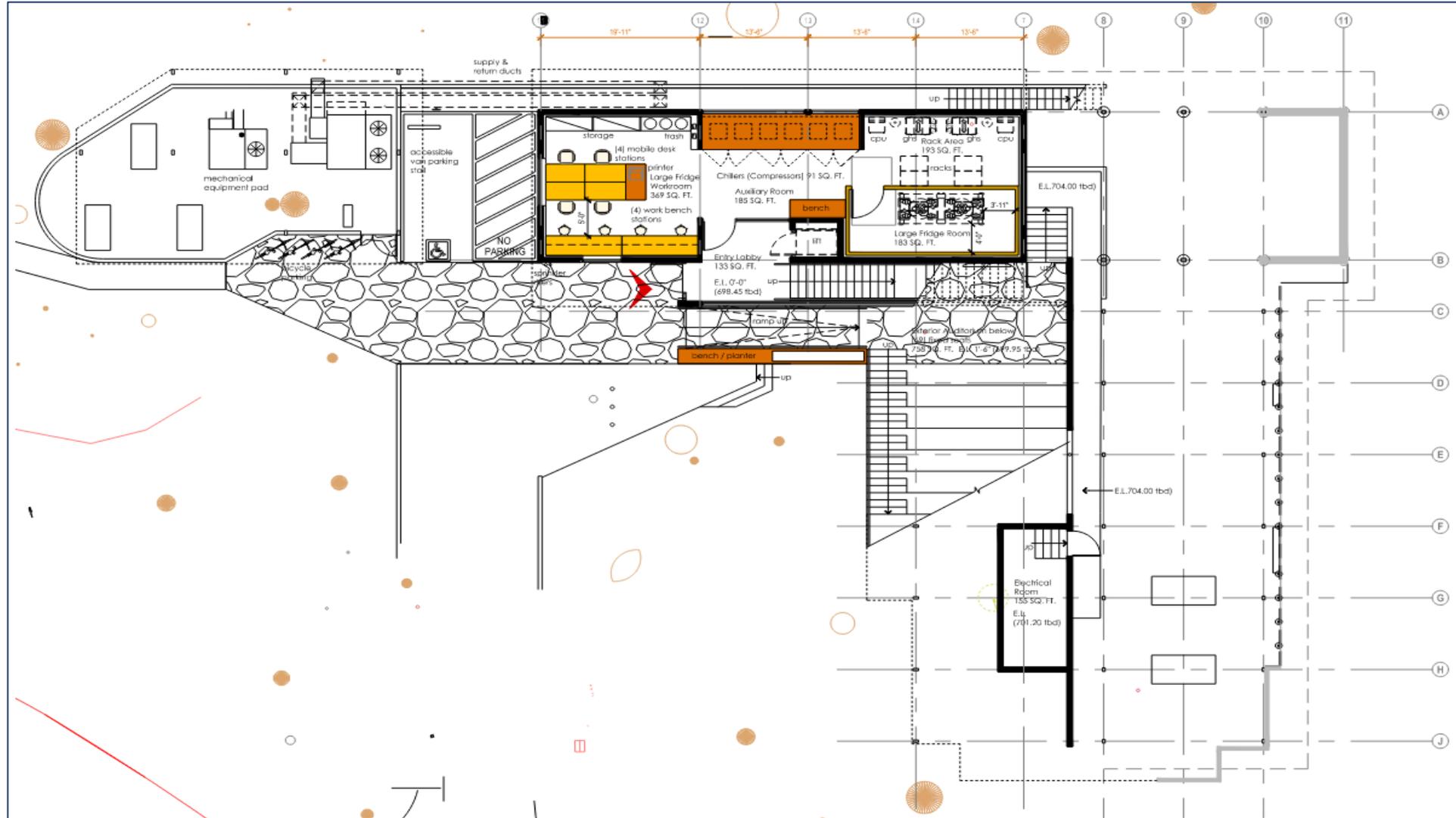
Project Scope:

- Abate & demolish building interior
- Upgrade building structure
- Remodel/upgrade building interior and systems.

B73 SITE PLAN



1ST FLOOR PLAN



2ND FLOOR PLAN



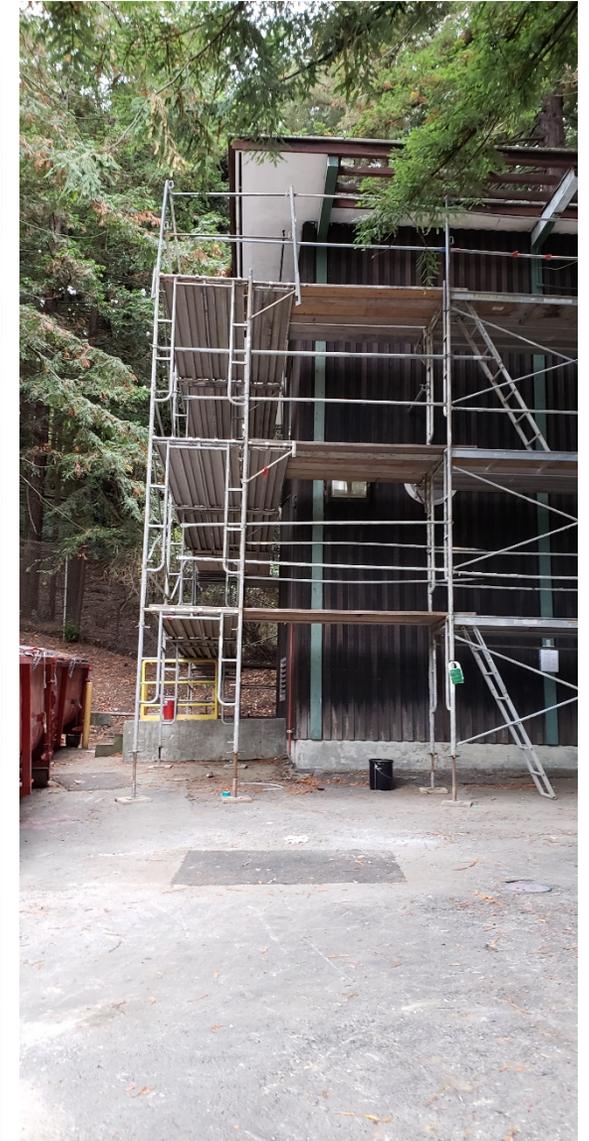
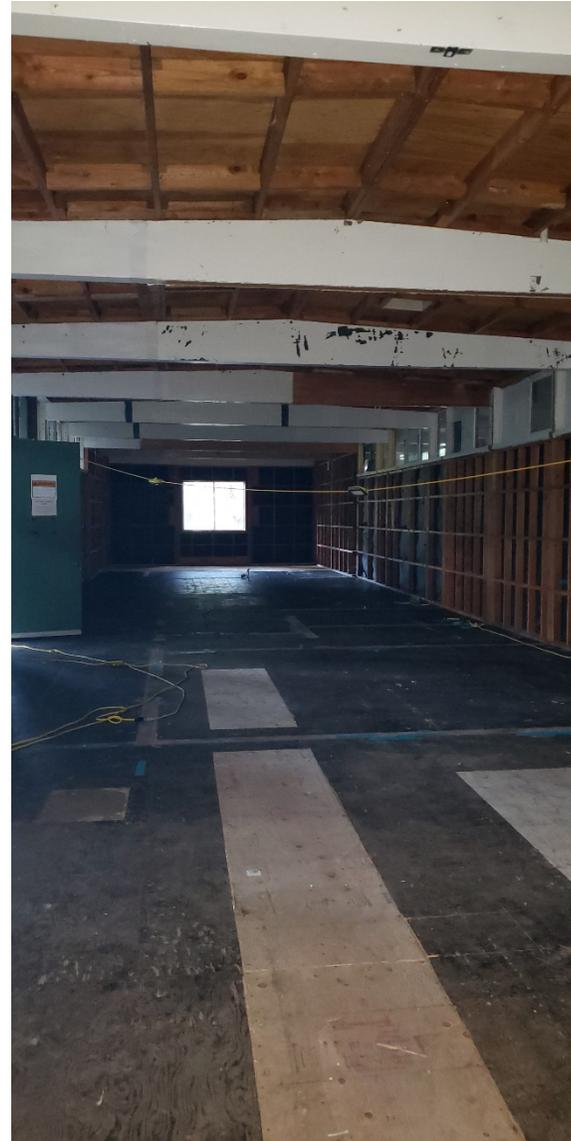
ACCOMPLISHMENTS

The Lab has retained experts to help produce and analyze the following:

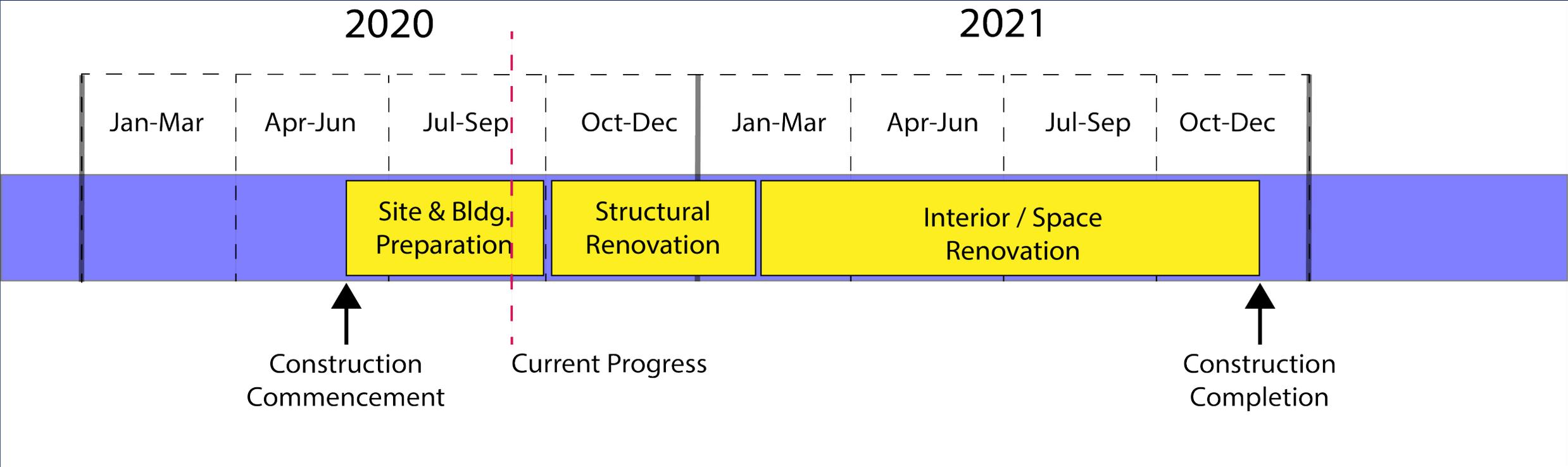
- Design
- Biological Resources
- Site Geology
- Site Topography
- Building Abatement Issues
- Building History
- Traffic Issues

The abatement of B73 is done and the interior has been gutted.

The scaffolding is being setup for next steps.



SUMMARY SCHEDULE



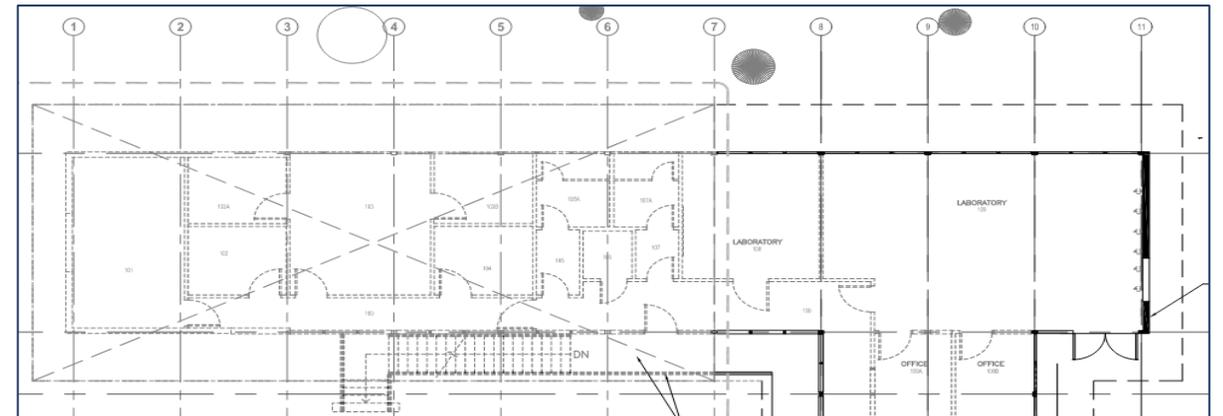
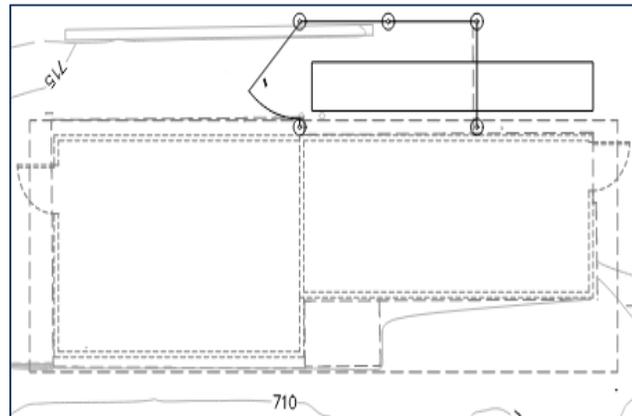
WHAT TO EXPECT

1. SITE AND BUILDING PREPARATION:

- Waste bins located near B73 for material abatement



2. COMPLETE DEMOLITION of B73A and ~40% of B73



WHAT TO EXPECT



PROJECT CONSTRUCTION:

- Pour concrete for structural renovation of foundations, piers, beams, retaining walls, etc.
- Deliveries with various size heavy duty trucks.
- Typical construction activities for a new building: building erection, electrical & mechanical components, interior walls, furniture, etc.



QUESTIONS?



THANK YOU